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ABSTRACT

Jean Piaget's ideas regarding symbolic function are expanded in this paper to provide a model to use in distinguishing between general symbolic versus specific linguistic deficits in language disordered children (whose disorders are not due primarily to intellectual, sensory, motor, or social-emotional deficits). In applying this model to the assessment of language disordered children, the paper suggests that nonverbal cognitive assessment needs to distinguish between symbolic imagery and nonrepresentational aspects of nonverbal cognition. The paper also reviews the literature relevant to the issue and notes that, in light of various methodological problems encountered in these studies, the evidence to substantiate the existence of broad representational deficits and specific linguistic deficits in this language disordered population is far from conclusive. The paper concludes that a knowledge of the problems encountered in this previous research should serve to guide future research efforts. (Author/FL)

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Symbolic Function in Piagetian Theory: Implications for the Nonverbal
Cognitive Assessment of Language Disordered Children

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Symbolic Functioning in Piagetian Theory:
Implications for the Nonverbal Cognitive
Assessment of Language Disordered Children

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Language disordered children with normal nonverbal intelligence, hearing acuity, and social-emotional development are often treated in the literature as a homogeneous population (e.g., Freedman & Carpenter, 1976; Leonard, Bolders, & Miller, 1976). However, clinical observation indicates that these children represent a far more heterogeneous group than this literature assumes. Piaget's conception of symbolic function (the ability to represent nonpresent objects and situations) as a unitary construct underlying both language and mental imagery offers one theoretical explanation for a source of difference within this population. According to this view, some language disordered children may exhibit deficits in symbolic functioning in general while others may have deficits in the linguistic domain only. This distinction has important implications for nonverbal cognitive assessment and the subsequent determination of prognosis and planning of goals for management for these children. Indeed, a few researchers have suggested and a small amount of empirical evidence supports the notion that a broad representational deficit--encompassing both language and imagery--may exist in some children in this population (deAjouraguerra, Jaeggi, Guignard, Kocher, Maguard, Roth, & Schmid, 1976; Inhelder, 1976; Morehead & Ingram, 1973).

While a theoretical and a tentative empirical distinction has

been suggested as a source of heterogeneity within this population, neither sample selection in subsequent research nor currently existing approaches to language assessment reflect the possibility of delineating between the linguistic versus imaginal aspects of symbolic functioning. This paper uses Piaget's ideas regarding symbolic function as a framework for making distinctions in the assessment of nonverbal cognitive skills in language disordered children which have to date been largely ignored--namely, distinguishing between broad symbolic (representational) deficits and specific linguistic deficits. This involves attempting to separate out symbolic imagery from nonrepresentational aspects of nonverbal intelligence. The following discussion extends Piaget's ideas regarding symbolic function to offer a theoretical model which can be applied to understanding and assessing language disordered children. The literature relevant to this framework is critically reviewed. Methodological problems encountered in these studies suggest ways to more rigorously approach future research in this area.

Theoretical Background

Crucial to understanding Piaget's notions regarding symbolic function is his idea that intelligence consists of two complementary aspects--the operative and figurative. Operative knowledge refers to the logical psychological structures reflected in the organized ways in which children act upon their environment. Through repeated active interaction, children gradually construct increasingly general, more widely applicable internal organizations which give meaning to correspondingly greater amounts of their

world. Piaget describes some of these internal organizations in terms of schemes such as object permanence, conservation, probability, etc. Figurative knowledge refers to the static representation of reality as it appears to the senses. The figurative instruments are those employed in attempting to copy the static, figural aspects of an event and include perception and the symbolic instrument of imagery.

While Piaget believes that language has both a figurative and an operative component, he is not specific in explicating what these components are (1970). In this paper, the position is taken that the figurative aspect of language is the linguistic symbol's physical status (the actual superficial configuration of the acoustic or visual signal) which can be observed by another and thus serves as a means of communication between persons. The operative aspect of language, on the other hand, is that aspect which is quite often referred to as language structure (which indeed suggests its logical, operative nature). This includes the unobservable, abstract rule systems underlying phonological, morpho-syntactic, and most likely many pragmatic aspects of language. In this paper, the logical structure underlying language form has been "located" in an area referred to as the linguistic processor.

For both language and imagery, symbolic function is in effect the bridge between the operative and figurative components of knowledge. It is the process whereby figurative symbols are assimilated to operative schemes and thus conferred with meaning. For language, in extending Piaget's notions, it is suggested that the figurative input must detour by way of a linguistic processor be-

fore being assimilated to operative structures. The important aspect of Piaget's theory regarding symbolic function is that he sees both language and imagery as reflections of one general underlying capacity to symbolize.

Since Piaget conceives of symbolic function as a process reflecting a single underlying ability, it is theoretically possible that a language disorder could be part of a more general deficit in symbolic function. In this case, a child would also show deficits in the various manifestations of imagery--e.g., deferred imitation, symbolic play, gesture, and drawing. However, as noted earlier, language has both a figurative and operative component. It is possible that a language deficit (keeping in mind that the population has no intellectual, sensory, or emotional deficits) could be more specific to the "linguistic processor" mentioned earlier. In this case, symbolic function relying on imagery should remain intact. Figure 1 shows how symbolic function "bridges" between figurative and operative knowledge for both linguistic and imaginal symbols. A general symbolic deficit would take place in the symbolic function area and would influence both language and mental images. A specific linguistic deficit would take place in the area of the linguistic processor, allowing symbolic function using imagery to remain intact. It is perhaps important to add here that these two profiles are being suggested only for children who have both receptive and expressive language delays. There is no reason to suspect a general symbolic deficit in a child who does demonstrate linguistic competence receptively, but who, for whatever reasons, cannot produce language at a commensurate level.

Piaget's notions of symbolic functioning and his figurative-operative model of intelligence provides a framework for what one chooses to measure in assessing the nonverbal cognitive abilities of language impaired children and how such information should be interpreted. Moreover, it suggests reinterpretation of many procedures currently used for assessment. Determining a child's nonverbal intelligence is not new to language assessment; by definition these children perform far better on performance items of intelligence tests than they do on verbal items. However, the figurative-operative model suggests that a nonverbal performance assessment further differentiates operative knowledge from figurative knowledge in the form of mental images. Procedures which are currently considered to tap a child's nonverbal cognitive skills may be tapping either or both of these. Results from such a test would obscure determining if a particular language disordered child has a deficit in symbolic functioning in general.

To assess a child's operative knowledge, the aim is to present the child with tasks which will reflect his or her organization of reality while relying minimally on his or her figurative knowledge in both language and mental imagery. While all thought beyond the sensorimotor period requires at least some symbolic representation, the development of operative knowledge can proceed relatively independent of its symbolic support up through concrete operations (Furth, 1969, 1970a and b; Inhelder, 1966; Sinclair, 1973, 1975, etc.). It is this independent aspect of operativity we wish to assess.

To avoid penalizing language disordered children for their

linguistic deficit, operative tasks must be used which can be altered so as to dispense with almost all or all reliance on language. Language disordered children thus need minimal linguistic competence in order to understand the nature of tasks and to carry out responses. Miller (1976) reviews and critiques several methods of nonverbal assessment of Piagetian concepts. In this article he concludes that in general, children do not perform differently on nonverbal versions of these tasks than they do on verbal versions. Siegel (1978) also discusses several nonverbal versions of Piagetian tasks and provides data suggesting, contrary to Miller's conclusions, that often children succeed on nonverbal versions at an earlier age than they do on the traditional verbal tasks. While this issue remains unresolved, one should remain aware of the possibility of performance discrepancies between verbal and less verbal or nonverbal tasks.

In figurative assessment, we are attempting to determine how well the figurative instruments of mental imagery and language serve the child's particular level of operative knowledge. Since figurative knowledge depends on the level of operative knowledge, this part of an assessment can best be conceived of as tapping how well a child's uses of the figurative instrument of mental imagery reflect his or her level of operative knowledge. We want to determine if there is a gap between figurative knowledge and operative knowledge. The difference between this part of the assessment and the operative assessment is the degree of reliance on figurative imagery which the tasks require. Procedures which can be used for the assessment of mental imagery--systematically

observing symbolic play, drawing, gesture, etc.--are usually thought of as tapping a child's nonverbal cognitive skills. Using the figurative-operative model, we want to consider a child's ability to use mental imagery in the service of his or her operative knowledge as a separate goal.

The assessment of imagery can be divided into tasks appropriate for assessing preoperational children and those which require concrete operational reasoning for successful execution. As described by Piagetian theory, imagery in the preoperational stage is static, whereas it becomes dynamic in the concrete operational stage. Children in concrete operations can use images to anticipate transformations of figures. By and large, the traditional Piagetian tasks are mainly suitable for assessing imagery in children who have achieved a concrete operational level of thought. There are other tasks and informal assessments derived from Piagetian theory which are suitable for the preoperational stage.

Conceptually, the distinction between broad representational deficits and specifically linguistic deficits within the population of language disordered children is plausible within the frame of Piagetian theory. There is, however, little convincing empirical evidence to support this notion. The most compelling evidence to date, although not without problems, comes from European research which dates back to the early 1960's (deAjuriaguerra et al., 1965; Inhelder, 1963; Stambak, Heriteau, Auzias, Berges, & deAjuriaguerra, 1964). Since that time, there have been a handful of American studies that have either directly or indirectly addressed issues similar to those of the European studies. This litera-

ture is reviewed below.

Review of the Literature

The seminal work which suggested a broad representational deficit in language disordered children was conducted in Geneva, Switzerland by Bärbel Inhelder, a colleague of Piaget. This work was originally published in French in 1963, and has since been translated into English and published in an edited book by Donald and Ann Morehead (1976). The tasks which Inhelder used to assess figurative symbolism included tasks of anticipatory imagery (e.g., anticipating liquid levels as a glass jar is tilted, anticipating the shadow of a rod or circle as a function of its position in relation to a light source, anticipation of the rotation of a square in relation to a fixed point of reference) and perceptual perspective taking (choose pictures of how a group of mountains would look to an observer from various viewpoints). Operative skills were also assessed using tasks such as classification of geometric shapes, equivalence of numerical groupings, logical inclusion, and conservation of weight and substance.

In the translated version of this paper, Inhelder states that "it is commonly known that in some forms of aphasia the problems of symbolic function are not limited to language but also affect spatial representation. . . However, development of the operative aspect of thought seems to be almost normal" (p. 240). However, the reader is less convinced of this claim than Inhelder, since she reports only that the "majority" of a "group" of dysphasic children showed this pattern. More specific data is not available, nor is the methodology clearly specified. Furthermore, a

definition of "dysphasia" is not provided and as such one does not know what types of children were included in the population studied.

A second Genevan study conducted by deAjuriaguerra and his colleagues (deAjuriaguerra et al., 1965, translated into English, 1976) lends further support to Inhelder's claims. Of 40 dysphasic children originally studied by this group, 85% had "clear and admittedly important problems in the realm of spatial representation" (1976, p. 349). These researchers used anticipatory imagery tasks similar to those employed by Inhelder. These children exhibited both receptive and expressive language delays in conjunction with normal reasoning ability. However, the population in this study included children considered neurotic and psychotic. On the other hand, American studies have generally specified normal social-emotional development as one of the criteria for a child being classified as "dysphasic." It is certainly possible that emotionally disturbed children might also exhibit broad representational deficits. However, as the authors noted, "the intellectual organization was more integrated in children who did not present notable affective difficulties" (1976, p. 350). Considering the nascent state of this research, it seems it would currently be more difficult to empirically support claims of a general representational deficit in conjunction with normal reasoning with these children included in the population.

The earliest American study which directly addressed the issue of a possible representational deficit in language disordered children was carried out by Morehead (1972). In this article,

Morehead reports findings of two studies which, although preliminary in nature, clearly support the earlier Genevan work.

The first study observed children's symbolic play behavior. In Piaget's theory, symbolic play is one observable manifestation of mental imagery. Morehead reasoned that if a general representational deficit was indeed underlying the linguistic deficits of the language disordered children he observed, the linguistic level and symbolic play would be more closely related than linguistic level and general (nonverbal) intellectual development. Although only 5 children were observed, this pattern did in fact emerge in his first study. A similar earlier study by Lovell, Hoyle, & Siddall (1968) found, on the contrary, that "there was not much difference between speech-delayed and normal-speaking children in respect to the amount of time spent on symbolic play" (p. 49). However, in this study "it was reckoned that they [the 10 aphasic subjects] would not be deficient in understanding the spoken word but only in producing it" (p. 42). As mentioned earlier, there is no reason to suspect a general representational deficit in children who do have age level linguistic competence in the comprehension domain.

In the second study reported by Morehead (1972), he divided up all of the subtests of the Illinois Test of Psycholinguistic Ability, Experimental Edition (ITPA) (McCarthy & Kirk, 1961) into those reflecting representational (figurative) skills and those reflecting base intellectual (operative) skills. Information regarding exactly which subtests fell into each category was not provided in this preliminary report. Morehead predicted that

scores on the representation subtests would relate to scores on the Goodenough Draw-a-Man Test (Goodenough, 1926), presumably since the latter reflects figurative abilities manifested in drawing. The base intellectual subtests, on the other hand, would relate to scores on two other nonverbal tests of cognitive development, the Columbia Mental Maturity Scale (Burgmeister, Blum, & Lorge, 1954) and the Leiter International Performance Scale (Arthur, 1952). Furthermore, the latter set of scores would also be more closely related to chronological age, whereas the representational tasks would show more of a lag in relation to chronological age. A preliminary analysis of data collected on 120 children between 4 and 10 years of age tended to support these hypotheses. Unfortunately, a more complete analysis of these data was not subsequently published.

Morehead's use of the Goodenough-Draw-a-Man Test as an assessment of imagery skills deserves a word of caution. Several variables besides imagery skills may account for poor performance on this task, including problems with fine motor skills, visual perception, and body image concept. Future research should control for these possibly confounding variables by making independent assessments of these other skill areas. The researcher or diagnostician needs to be aware of the set of task demands on any particular measure. A child's performance on each needs to be assessed before one can validly draw conclusions regarding the child's skill in one particular area.

One subtest of the ITPA distinguished aphasic from normal children in another study conducted by Stark (1966). Although the

author's intent was not to determine the existence of a general representational deficit in some members of the aphasic population, his data do in fact support such a position. Stark administered three subtests to 22 nonverbal children ranging in age from 4;11 to 9;1. The children had normal intelligence, and both an expressive and receptive language delay. The three subtests and the average standard score obtained on each were as follows:

1. Visual Decoding (-.03 SD)
2. Visual-Motor Association (-.75 SD)
3. Visual-Motor Sequencing (-1.56 SD)

The Visual Motor Sequencing Subtest (referred to as Visual Sequential Memory on the ITPA Revised Edition, Kirk, McCarthy, and Kirk, 1968) requires the child to reproduce sequences (ranging from 2 to 8 figures in length) of non-meaningful figures from memory after being shown the sequence for five seconds. Successful performance of such a task appears to rely heavily on mental imagery abilities. The rather low scores on this subtest may as such reflect imagery deficits in the aphasic population. Again, however, the possibility of confounding deficits, such as memory problems, needs to be systematically ruled out. In another subtest, Visual Decoding (now Visual Reception), the child is shown the stimulus picture for three seconds, then the page is turned and he or she is asked to choose a conceptually similar object or situation from among four choices. While a rudimentary level of imagery might be necessary to perform this task, it clearly does not place the demands on imagery that the Visual Sequential Memory Subtest does. The aphasic children performed within normal range

on this subtest, as they did on the Visual Motor Association Subtest, which does not appear to require imaging for successful performance. Stark notes that "the performances of these children were highly individual" (p.157). It would be interesting to see if in the individual data, it appeared that some children exhibited imagery deficits while other children did not, since Piagetian theory would predict that both patterns are possible.

The most recent American attempt to address the possibility of a broad representational deficit in language disordered children was conducted by Murphy (1978). In this study, 11 language disordered children and 11 normal children were administered four tasks, all believed to tap mental imagery skills. Two tasks were similar to Inhelder's tasks; two others were drawn from American literature on imagery in the adult population. The results showed a significant difference between the two groups on only one of the tasks. Moreover, there was very little correlation between scores on the various tasks, calling to question whether they were all tapping an underlying ability to form and manipulate mental images. While Murphy's findings fail to support the hypothesis of a general representational deficit, there are aspects of the study which question the validity of her findings.

First of all, Murphy grouped her data for statistical analysis. It is possible that individuals within the language disordered group may have exhibited imagery deficits but that the differences may have been obscured in the grouped data. However, Murphy did report individual data. An examination of individual scores failed to locate such a subgroup. A more serious criticism of Murphy's

study may stem from the original procedures she used for matching the language disordered and normal children. The children were originally matched on nonverbal intelligence by scores on the Colored Ravens Progressive Matrices Test (Raven, 1965). It may be, as even Murphy suggested, that this particular test itself relies rather heavily on mental imagery, especially items which require the child to perceptually complete incomplete figures. As such, the children could have been originally selected on the basis of having adequate representational imagery skills.

The critical analysis of studies to date provides direction to future research efforts in this area. In order to arrive at more conclusive findings, methodological problems encountered in previous studies need to be dealt with in future studies. In summary, problems occurred in three major areas (1) sample selection criteria for the language disordered children, (2) methods of matching normal and language disordered children on nonverbal cognitive development, and (3) ruling out problems in other skill areas (e.g., fine motor, body imagery) assessed by some imagery measures. Attempts to address these problem areas will lead to far more convincing findings.

Conclusions

Besides bolstering or refuting notions set forth in Piagetian theory regarding symbolic function; the importance of separating general symbolic from specifically linguistic deficits in language disordered children resides in the influence this determination would have on establishing goals for intervention. With a child exhibiting general symbolic deficit, developing mental imagery

through deferred imitation, symbolic play, gesture, and drawing would constitute plausible goals in addition to (or perhaps better, in conjunction with) specifically linguistic goals for intervention. Furthermore, the research to date has provided initial evidence that this distinction will also have implications for a child's prognosis, an issue which has been sorely neglected with this population. DeAjuriaguerra and his colleagues (deAjuriaguerra et al., 1976) provided some evidence that children exhibiting a general representational deficit have poorer prognosis for cognitive development in general, reaching a ceiling in the concrete operational stage.

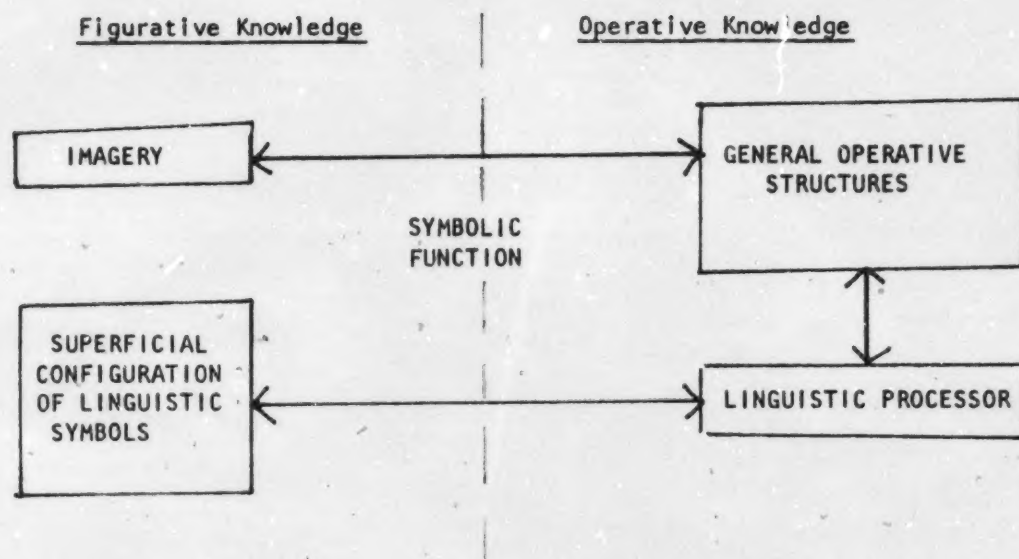


Figure 1. A model of symbolic function.

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